



PATENT COOPERATION TREATY

PCT

INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

Applicant's or agent's file reference E052485-GP	FOR FURTHER ACTION		See Form PCT/PEA/416
International application No. PCT/IT 03/00462	International filing date (day/month/year) 25.07.2003	Priority date (day/month/year) 25.07.2003	
International Patent Classification (IPC) or national classification and IPC F23R3/36			
Applicant ANSALDO ENERGIA S.P.A.			
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 5 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> sent to the applicant and to the International Bureau a total of 3 sheets, as follows:</p> <p style="margin-left: 40px;"><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p>b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>			
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>			
Date of submission of the demand 27.09.2004		Date of completion of this report 21.10.2005	
Name and mailing address of the international preliminary examining authority:  European Patent Office - P.B. 5818 Patentlaan 2 NL-2280 HV Rijswijk - Pays Bas Tel. +31 70 340 - 2040 Tx: 31 651 epo nl Fax: +31 70 340 - 3016		Authorized Officer Coli, E Telephone No. +31 70 340-3802 	

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
PCT/IT.03/00462

Box No. I Basis of the report

1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
 - ☐ publication of the international application (under Rule 12.4)
 - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report)*:

Description, Pages

1-14	as originally filed
15	received on 19.07.2005 with letter of 13.07.2005

Claims, Numbers

1-17	received on 19.07.2005 with letter of 13.07.2005
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Drawings, Sheets

1/6-6/6	as originally filed
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- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

* If item 4 applies, some or all of these sheets may be marked "superseded."

**INTERNATIONAL PRELIMINARY REPORT
ON PATENTABILITY**

International application No.
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Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement

1. Statement

Novelty (N)	Yes: Claims	1-17
	No: Claims	
Inventive step (IS)	Yes: Claims	1-17
	No: Claims	
Industrial applicability (IA)	Yes: Claims	1-17
	No: Claims	

2. Citations and explanations (Rule 70.7):

see separate sheet

Re Item V

**Reasoned statement with regard to novelty, inventive step or industrial applicability;
citations and explanations supporting such statement**

- 1 Reference is made to the following document:
D1: US-A-4 890 453 (IWAI KAZUMI ET AL) 2 January 1990 (1990-01-02)
- 2 The document D1 is regarded as being the closest prior art to the subject-matter of claim 1, and shows (cf. c. 2, l. 66 - c. 5, l. 53; the references in parentheses applying to this document):
a turbine burner (25) comprising:
 - a secondary feed unit for the supply of a secondary or backup mixture (11) and the discharge of said mixture from an opening (36) to a combustion zone facing said opening (36), said secondary feed unit comprising an axial air tube (38) terminating in a axial swirler (39);
 - a primary supply unit comprising a primary mixture tube (41) and a primary mixture channel (cf. channel defined by annular wall (48)) intended for the supply of said primary mixture, arranged concentrically with said secondary feed unit and with said axial air tube (38), said primary mixture channel having a fluid flow connection to said primary mixture tube (41).

The subject-matter of claim 1 differs from this known turbine burner in that said primary mixture channel (24) comprises an annular wall (28) forming, at a distance radially from the axial air tube (14), a cavity (29), and extending axially far enough to be close to the combustion zone (6), being thus capable of conveying said primary mixture directly to said combustion zone (6) facing said opening (4), directly downstream of the opening (4) of said axial swirler (18), and in that the primary mixture channel (24) provides for a nozzle ring (26) to which is connected the annular wall (28), the nozzle ring (26) having a plurality of primary mixture holes (32), passing through said ring, so as to provide fluid flow communication between the primary mixture tube (22) and the cavity (29) between the annular wall (28) of the primary mixture channel (24) and the axial air tube (14), whereby the primary mixture coming from the primary mixture tube (22) passes through said primary mixture holes (32) which impart to said primary mixture a swirling and turbulent motion along the cavity (29) until, maintaining this vigorous swirling motion, it arrives directly at the

combustion zone (B) facing the outlet of the axial swirler (18).

The subject-matter of claim 1 is therefore new (Article 33(2) PCT).

- 3 The problem to be solved by the present invention may be regarded as to improve a turbine burner of the type known from the prior art so to achieve a more efficient combustion of primary mixtures which are not of constant composition.
- 4 The skilled person would not be prompt to amend D1 in the direction of the solution proposed in claim 1 to solve this problem, since this would require a number of non obvious steps away from the closest prior art.
The subject-matter of claim 1 does involve therefore an inventive step (Article 33(3) PCT).
- 5 Claims 2-17 are dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.
- 6 Contrary to the requirements of Rule 5.1(a)(ii) PCT, the relevant background art disclosed in the document D1 is not mentioned in the description, nor is this document identified therein.

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are deposited on the axial swirler, requiring lengthy and difficult maintenance and/or repair work.

[0087]. According to a further advantageous aspect, the baffle arranged upstream of the axial swirler in the axial air tube prevents an inflammable mixture from being drawn towards the cavity which, when changing over from backup operation to nominal operation, would lead to undesirable and dangerous explosions.

[0088]. According to a further advantageous aspect, the number of the gas-steam holes in the sleeve maintain a large difference in pressure between the gas-steam pipe and the cavity, limiting the moving back of turbulence and instability from said cavity towards the gas-steam pipe.

[0089]. Finally, according to a still further advantageous aspect, the primary mixture channel is of simple construction and can be used in place of designs already in operation to improve their efficiency.

[0090]. It is clear that a person skilled in the art, for the purpose of meeting incidental and specific requirements, will be able to make numerous changes and produce numerous variants to the burner described above, without thereby departing from the scope of the invention as defined in the following claims.

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CLAIMS

1. A turbine burner (1) comprising

- a secondary feed unit for the supply of a secondary or backup mixture and the discharge of said mixture from an opening (4) to a combustion zone (6) facing said opening (4), said secondary feed unit comprising an axial air tube (14) terminating in an axial swirler (18);
- a primary feed unit comprising a primary mixture tube (22) and a primary mixture channel (24) intended for the supply of a primary mixture, arranged concentrically with said secondary feed unit and with said axial air tube (14), said primary mixture channel (24) having a fluid flow connection to said primary mixture tube (22),

wherein said primary mixture channel (24) comprises an annular wall (28) forming, at a distance radially from the axial air tube (14), a cavity (29), and extending axially far enough to be close to the combustion zone (6), being thus capable of conveying said primary mixture directly to said combustion zone (6) facing said opening (4), directly downstream of the opening (4) of said axial swirler (18), and wherein the primary mixture channel (24) provides for a nozzle ring (26) to which is connected the annular wall (28), the nozzle ring (26) having a plurality of primary mixture holes (32), passing through said ring, so as to provide fluid

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→

16b

flow communication between the primary mixture tube (22) and the cavity (29) between the annular wall (28) of the primary mixture channel (24) and the axial air tube (14), whereby the primary mixture coming from the primary mixture tube (22) passes through said primary mixture holes (32) which impart to said primary mixture a swirling and turbulent motion along the cavity (29) until, maintaining this vigorous swirling motion, it arrives directly at the combustion zone (6) facing the outlet of the axial swirler (18).